CLAIMS

What is claimed is:

1. A fin for a heat exchanger comprising a plurality of waving strips, each having a repeated structure comprising a first flat portion, a first inclined plate portion extending from said first flat portion at a first inclination angle, a second flat portion extending from said first inclined plate portion in parallel to said first flat portion, and a second inclined plate portion extending from said second flat portion at a second inclination angle, arranged in this order, wherein said waving strips are arranged adjacent to each other in a transverse direction to each waving strip and are offset from each other in a longitudinal direction, such that said adjacent waving strips are connected at connecting portions between said first flat portions of said adjacent waving strips and between said second flat portions of said adjacent waving strips, and a length (T) of each connecting portion in said longitudinal direction of each waving strip is less than or equal to about a thickness (t) of a plate forming each waving strip.

2. The fin of claim 1, where first said length (T) is a first distance between a first critical point between said second inclined plate portion and said first flat portion of one of said waving strips and a second critical point between said first flat portion and said first inclined plate portion of an adjacent one of said waving strips, and a second distance between a third critical point between said first inclined plate portion and said second flat portion of one of said waving strips and a fourth critical point between said second flat portion and said second inclined plate portion of an adjacent one of said waving strips.

3. A heat exchanger comprising:

a plurality of flat-type heat transfer tubes and

an inner fin provided in each heat transfer tube, said inner fin comprising a plurality of waving strips, each having a repeated structure comprising a first flat portion, a first inclined plate portion extending from said first flat portion at a first inclination angle, a second flat portion extending from said first inclined plate portion in parallel to said first flat portion, and a second inclined plate portion extending from said second flat portion at a second inclination angle, arranged in this order, wherein said waving strips are arranged adjacent to each other in a transverse direction to each waving strip and are offset from each other in a longitudinal direction, such that said adjacent waving strips are connected at connecting portions between said first flat portions of said adjacent waving strips and between said second flat portions of said

adjacent waving strips, and a length (T) of each connecting portion in said longitudinal direction of each waving strip is less than or equal to about a thickness (t) of a plate forming each waving strip.

4. The heat exchanger of claim 3, where said length (T) represents a first distance between a first critical point between said second inclined plate portion and said first flat portion of one of said waving strips and a second critical point between said first flat portion and said first inclined plate portion of an adjacent one of said waving strips, and a second distance between a third critical point between said first inclined plate portion and said second flat portion of one of said waving strips and a fourth critical point between said second flat portion and said second inclined plate portion of an adjacent one of said waving strips.

5. The heat exchanger of claim 3, wherein said inner fin is brazed to each adjacent heat transfer tube.

6. The heat exchanger of claim 3, wherein said heat exchanger is formed as a multi-flow type heat exchanger comprising a pair of headers, and said plurality of heat transfer tubes interconnecting said pair of headers.

7. A heat exchanger comprising:

a plurality of flat type heat transfer tubes and

an outer fin provided at a position outside of each heat transfer tube, said outer fin comprising a plurality of waving strips, each having a repeated structure comprising a first flat portion, a first inclined plate portion extending from said first flat portion at a first inclination angle, a second flat portion extending from said first inclined plate portion in parallel to said first flat portion, and a second inclined plate portion extending from said second flat portion at a second inclination angle, arranged in this order, wherein said waving strips are arranged adjacent to each other in a transverse direction to each waving strip and are offset in a longitudinal direction such that said adjacent, waving strips are connected at connecting portions between said first flat portions of said adjacent waving strips and between said second flat portions of said adjacent waving strips, and a length (T) of each connecting portion in said longitudinal direction of each waving strip is less than or equal to about a thickness (t) of a plate forming each waving strip.

8. The heat exchanger of claim 7, wherein said length (T) represents a first distance between a first critical point between said second inclined plate portion and said first flat portion

of one of said waving strips and a second critical point between said first flat portion and said first inclined plate portion of an adjacent one of said waving strips, and a second distance between a third critical point between said first inclined plate portion and said second flat portion of one of said waving strips and a fourth critical point between said second flat portion and said second inclined plate portion of an adjacent one of said waving strips.

9. The heat exchanger of claim 7, wherein said outer fin is brazed to each adjacent heat transfer tube.

10. The heat exchanger of claim 7, wherein said heat exchanger is formed as a multi-flow type heat exchanger comprising a pair of headers, and said plurality of heat transfer tubes interconnecting said pair of headers.

11. A method for manufacturing a fin for a heat exchanger comprising the steps of:

forming an intermediate pre-formed plate by passing a flat plate material between a pair of first processing rollers, wherein said intermediate pre-formed plate is formed, such that a plurality of zigzag strips each having a plurality of inclined plates connected successively in diagonal offset to each other and said zigzag strips are arranged adjacent to each other in a transverse direction to each zigzag strip and are offset by one-half pitch in a longitudinal direction and said adjacent zigzag strips are connected at a middle position of each inclined plate in a longitudinal direction of each inclined plate; and

forming a fin by passing said intermediate pre-formed plate between a pair of second processing rollers to bend said adjacent zigzag strips at a portion connecting said adjacent zigzag strips, such that said fin comprises a plurality of waving strips, each having a repeated structure comprising a first flat portion, a first inclined plate portion extending from said first flat portion at a first inclination angle, a second flat portion extending from said first inclined plate portion in parallel to said first flat portion, and a second inclined plate portion extending from said second flat portion at a second inclination angle, arranged in this order, wherein said waving strips are arranged adjacent to each other in a transverse direction to each waving strip and are offset from each other in a longitudinal direction, such that said adjacent waving strips are connected t connecting portions between said first flat portions of said adjacent waving strips and between said second flat portions of said adjacent waving strips, and a length (T) of each connecting portion in said longitudinal direction of each waving strip is less than or equal to about a thickness (t) of a plate forming each waving strip.

12. The method of claim 11, wherein said length (T) represents a first distance between a first critical point between said second inclined plate portion and said first flat portion of one of said waving strips and a second critical point between said first flat portion and said first inclined plate portion of an adjacent one of said waving strips, and a second distance between a third critical point between said first inclined plate portion and said second flat portion of one of said waving strips and a fourth critical point between said second flat portion and said second inclined plate portion of an adjacent one of said waving strips.